

THE INVENTION CLAIMED IS:

1. A lift pin/actuating assembly, comprising:  
a lift pin; and  
5 an actuating mechanism having an actuator  
configured to generate movement of the lift pin along a  
first axis, and a translation mechanism coupled to the  
actuator and configured to translate movement of the  
actuator along the first axis into movement of the lift pin  
10 along a second axis.

2. The assembly of claim 1, wherein the movement  
of the lift pin along the first axis is a vertical movement,  
and the movement of the lift pin along the second axis is a  
15 horizontally pivoting movement about the second axis.

3. The assembly of claim 1, wherein the  
translation mechanism comprises a motion stop configured to  
stop movement of the lift pin along the first axis at a  
20 predetermined point, and a motion translator configured to  
translate actuation of the lift pin along the first axis  
into movement of the lift pin along the second axis, after  
the predetermined point is reached.

4. The assembly of claim 2, wherein the  
translation mechanism comprises a motion stop configured to  
stop movement of the lift pin along the first axis at a  
predetermined point, and a motion translator configured to  
25 translate actuation of the lift pin along the first axis  
into movement of the lift pin along the second axis, after  
30 the predetermined point is reached.

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5. The assembly of claim 3, wherein the motion translator comprises a lever.

6. The assembly of claim 4, wherein the motion translator comprises a lever.

7. A method of operating a substrate lift pin, comprising:

10 applying vertical actuation to the pin;  
moving the pin vertically a first distance;  
contacting a vertical motion stop after moving the first distance; and  
translating further vertical actuation into horizontal movement of the pin.

8. The method of claim 7, wherein the horizontal movement is a horizontal pivoting movement.

9. The method of claim 8, wherein translating further vertical actuation into horizontal movement comprises employing a lever.

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10. A lift pin/actuating assembly for a substrate processing chamber, comprising:

25 a lift pin adapted to hold a substrate in the processing chamber;

a base on which the lift pin is mounted;  
a first mechanism adapted to raise and lower the base; and

30 a second mechanism adapted to convert vertical motion of the base into pivoting motion of the lift pin.

11. The assembly of claim 10, wherein the second mechanism pivots the lift pin outwardly as the base is lowered. *relative to what?*

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12. The assembly of claim 10, wherein the lift pin has a horizontally extending upper section on which the substrate is held.

10 13. The assembly of claim 10, further comprising a spring mounted on the base to bias the lift pin toward a storage position.

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15 14. The assembly of claim 13, wherein the second mechanism pivots the lift pin away from the storage position as the base is lowered.

15 15. A lift pin/actuating assembly for a substrate processing chamber, comprising:

20. a base; *52*  
a mechanism adapted to raise and lower the base; *54*  
a lever pivotally mounted on the base; *48*  
a lift pin adapted to hold a substrate in the processing chamber, the lift pin mounted on the lever; and *40*  
25 a stop adjacent the base and adapted to engage the lever to pivot the lever as the base moves vertically. *62*

*20*  
30 16. The assembly of claim 15, wherein a pedestal is mounted for vertical movement in the processing chamber, and the lift pin is moveable to pivot between a first position in which the lift pin obstructs a path of movement

of the pedestal and a second position in which the lift pin does not obstruct the path of movement of the pedestal.

56 17. The assembly of claim 16, further comprising  
5 a spring adapted to bias the lift pin toward the first position.

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60 18. The assembly of claim 17, wherein the base  
10 includes a step against which the spring biases the lever when the lever is not engaged by the stop.

15 19. The assembly of claim 18, wherein the spring biases the lever in a downward direction, and the stop engages the lever from below as the base is lowered.

20 20. The assembly of claim 15, wherein the lift  
pin has a horizontally extending upper section on which the  
substrate is held.

20 21. A method of operating a semiconductor  
processing chamber, comprising:

providing a lift pin;

mounting the lift pin so that it extends  
upwardly into the processing chamber;

25 lowering a base on which the lift pin is  
mounted; and

converting the lowering motion of the base  
into pivoting motion of the lift pin.

30 22. The method of claim 21, wherein the lift pin  
is pivoted outwardly as the base is lowered.

23. The method of claim 21, wherein the lift pin is pivoted between a storage position in which the lift pin is positioned to hold a substrate and a retracted position in which the lift pin is not positioned to hold the substrate.

24. The method of claim 23, further comprising raising the lift pin to lift the substrate from another lift pin provided in the processing chamber.

25. The method of claim 24, wherein the raising of the lift pin is performed by raising the base.

26. The method of claim 24, further comprising lowering the lift pin which lifted the substrate to place the substrate on a robot blade that has entered the processing chamber.

27. The method of claim 26, wherein the lowering of the lift pin is performed by lowering the base.

28. A processing chamber, comprising:  
a chamber enclosure;  
a lift pin adapted to hold a semiconductor substrate in the chamber enclosure;  
a base on which the lift pin is mounted;  
a first mechanism arranged to raise and lower the base; and  
a second mechanism adapted to convert vertical motion of the base into pivoting motion of the lift pin.

29. The processing chamber of claim 28, wherein the second mechanism includes a stop adjacent the base and adapted to engage a lever on which the lift pin is mounted, the lever being mounted on the base.

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30. The processing chamber of claim 28, further comprising a pedestal that is movable between a transfer position and a processing position, the lift pin being movable between a storage position in which the lift pin obstructs a path of movement of the pedestal and a retracted position in which the lift pin does not obstruct the path of travel of the pedestal.

31. The processing chamber of claim 30, further comprising a spring adapted to bias the lift pin toward the storage position.

32. A lift pin/actuating assembly for a semiconductor processing chamber, comprising:

a lift pin adapted to hold a substrate in the processing chamber; and

a movement mechanism on which the lift pin is mounted, the movement mechanism having a first range of movement in which lowering of the movement mechanism causes the lift pin to be lowered without pivoting and having a second range of movement in which lowering of the movement mechanism causes the lift pin to pivot.

33. The assembly of claim 32, wherein the first range of movement of the movement mechanism is above the second range of movement of the movement mechanism.

A) 34. The assembly of claim 32, wherein the movement mechanism pivots the lift pin between a storage position in which the lift pin is positioned to hold the substrate and a retracted position in which the lift pin is not positioned to hold the substrate.

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